



Available online at  
**ScienceDirect**  
[www.sciencedirect.com](http://www.sciencedirect.com)

Elsevier Masson France  
**EM|consulte**  
[www.em-consulte.com/en](http://www.em-consulte.com/en)



## Technical note

# Endoscopic septoplasty: Tips and pearls



Y. Pons\*, C. Champagne, L. Genestier, S. Ballivet de Régloix

Service d'ORL chirurgie cervicofaciale, hôpital d'instruction des Armées Percy, 101, avenue Henri-Barbusse, 92140 Clamart, France

## ARTICLE INFO

### Keywords:

Endoscopic septoplasty  
 Operative technique  
 Tips  
 Pearls

## ABSTRACT

This article is designed to provide a step-by-step description of our endoscopic septoplasty technique and discuss its difficulties and technical tips. Endoscopic septoplasty comprises 10 steps: diagnostic endoscopy, subperichondral infiltration, left mucosal incision, dissection of the left subperichondral flap, cartilage incision (0.5 centimetre posterior to the mucosal incision), dissection of the right subperichondral flap, anterior cartilage resection, perpendicular plate dissection, dissection and resection of the maxillary crest, endoscopic revision, mucosal suture and Silastic stents. A satisfactory postoperative result was observed at 3 months in 97% of cases in this series. The main contraindication to endoscopic septoplasty is anterior columellar deviation of the nasal septum requiring a conventional procedure.

© 2015 Elsevier Masson SAS. All rights reserved.

## 1. Introduction

Septoplasty is one of the endonasal procedures most commonly performed in otorhinolaryngology [1]. The first septoplasty techniques were performed by Freer in 1902 and Killian in 1905 [2,3]. Surgical techniques have subsequently been improved, especially with the advent of endoscopy. The first endoscopic septoplasty techniques were described by Stammberger and Lanza at the beginning of the 1990s [4,5]. Techniques differ from one team to another and the published results are therefore difficult to evaluate [6–10]. Our technique is based on all of these techniques with several specific modifications. The purpose of this article is to provide a step-by-step description of our operative technique, with particular emphasis on its difficulties and by proposing technical tips. We describe a standard procedure designed to relieve nasal obstruction (functional septoplasty).

## 2. Technique

### 2.1. Specific instruments and surgical team

#### 2.1.1. Surgical team

The surgeon can operate alone (without an assistant). However, a circulating nurse is necessary for gowning, removal of instruments and to connect suction and the video tower.

#### 2.1.2. Arrangement of the operating room

The (right-handed) surgeon is placed on the patient's right, the sterile instrument table is placed at the patient's head and the video tower is placed between the patient's left and the patient's head.

#### 2.1.3. Instrumentation

A 30° endoscope allows complete visualization of the nasal cavities and nasal septum, particularly the superior part, which is useful to provide access to the operculum of the middle turbinate, especially when an endoscopic procedure is performed on the frontal sinus.

A n° 15 scalpel blade is used to incise the mucosa and cartilage. A Cottle elevator allows atraumatic subperichondral dissection of mucoperichondral flaps on either side of the septum.

A suction elevator is used to aspirate blood from the operative cavity and can also be used to cautiously dissect the flaps. A self-retaining Killian speculum is used to retract the mucoperichondral flaps during septal sections to avoid obscuring the endoscope.

### 2.2. Our operative technique

#### 2.2.1. Diagnostic endoscopy

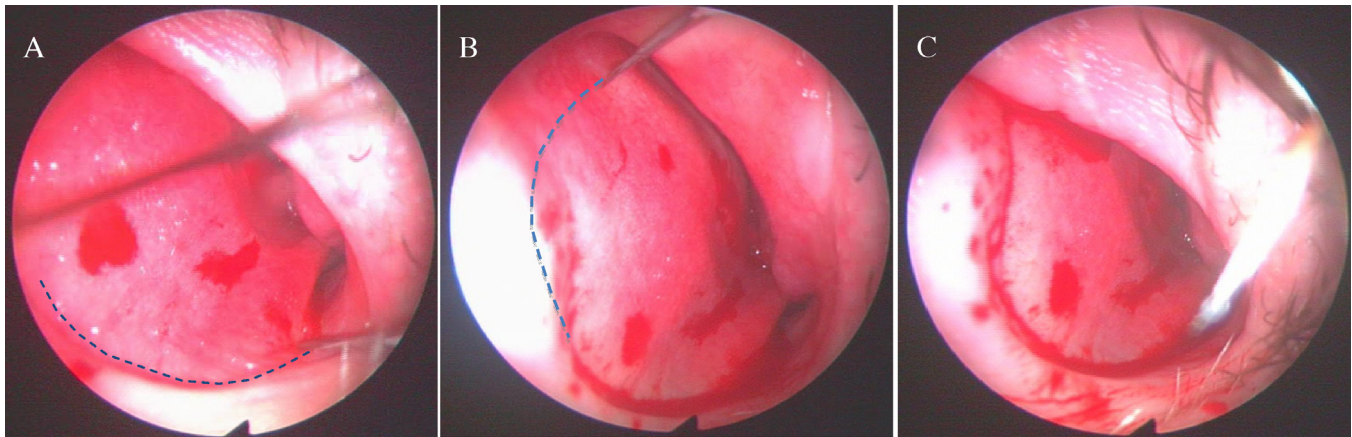
After packing with lidocaine/naphazoline to retract the mucosa, diagnostic endoscopy is performed to analyse all of the deformities of the septum and to plan the subsequent surgical repair.

#### 2.2.2. Infiltration

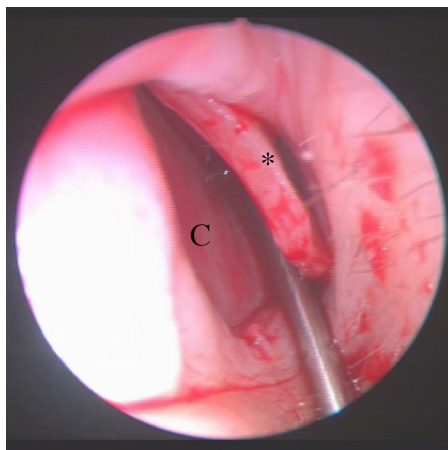
Subperichondral infiltration with lidocaine with 1% adrenaline limits intraoperative bleeding and initiates hydrodissection.

\* Corresponding author.

E-mail address: [pons.yoann@gmail.com](mailto:pons.yoann@gmail.com) (Y. Pons).



**Fig. 1.** Mucosal incision. A. The dotted line shows the mucosal incision performed in the left nasal cavity. B. The superior part of the incision is performed by raising the mucosa and alar cartilage underneath the nasal bones with the blunt edge of the scalpel and continuing the incision anteriorly as far as the initial incision (incision shown by a dotted line). C. The mucosa is completely incised.



**Fig. 2.** Dissection of the left septal surface. The left mucoperichondral flap (\*) is dissected from the septal cartilage (C) using a Cottle elevator.

### 2.2.3. Mucosal incision

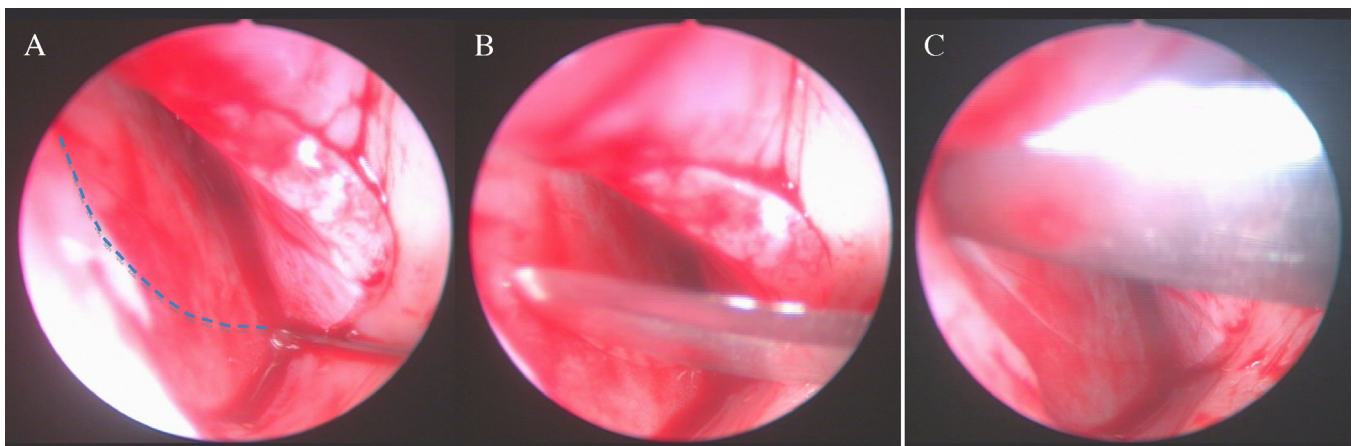
This incision is systematically performed in the left nasal cavity (for a right-handed surgeon) (Fig. 1). This very anterior arc-shaped incision passes anteriorly to the deviation of the maxillary crest inferiorly (and can even be prolonged on the floor of the nasal cavity), and is then continued superiorly and posteriorly beyond the plica vestibuli, underneath the nasal bones (in order to create a large operative cavity and to facilitate endoscopic navigation inside this cavity). The position of this incision is important and represents one of the major difficulties of the operation. If the incision is placed too posteriorly (which is sometimes the case during the learning phase of this endoscopic technique), anterior deviations of the septum will not be able to be corrected.

### 2.2.4. Dissection of the left septal surface

The left septal surface is dissected in the subperichondral plane using a Cottle elevator (Fig. 2), as far as the chondro-vomerine junction.

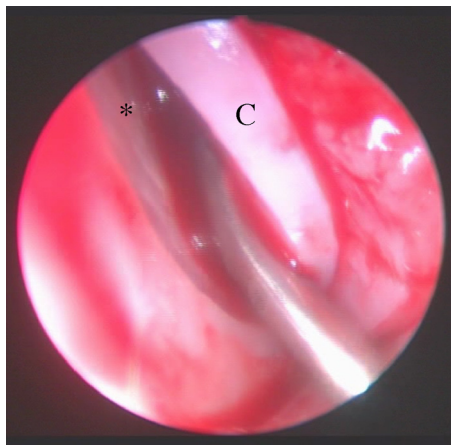
### 2.2.5. Cartilage incision

This incision is performed with a n° 15 scalpel blade about 0.5 centimetre posteriorly to the mucosal incision (Fig. 3). This small strip of cartilage will be used as a support for the mucosal flap at the time of closure. This incision must not be too deep to avoid transfixing the mucosa.



**Fig. 3.** Cartilage incision. A. Drawing of the cartilage incision (dotted line). B. The incision is performed 0.5 centimetre posteriorly to the mucosal incision. C. The cartilage is completely incised.

Infiltration generally starts in the posterior part of the septum and then ascends to the anterior part of the septum. Both the superior and inferior parts of the septum are injected, as far as the floor of the nasal cavity, to facilitate dissection of the maxillary crest. Both surfaces of the septum are infiltrated before incision.



**Fig. 4.** Dissection of the right septal surface. The right mucoperichondral flap (\*) is dissected from the septal cartilage (C) using a Cottle elevator.

#### 2.2.6. Dissection of the right septal surface

A Cottle elevator is used to find the plane of dissection (Fig. 4). Dissection must be performed gently and meticulously to avoid damaging the cartilage and transfixing the mucosa situated on the other side of the cartilage. In the subperichondral plane in the right nasal cavity, the flap is detached as far as the chondro-vomerine junction. The inferior part of this junction is then delicately dislocated.

#### 2.2.7. Anterior cartilage resection

A strip of anterior cartilage, about 2 cm long, extending as far as the vomer posteriorly, is resected (Fig. 5). When resection is performed with scissors, there is a risk of accidental section of the left nasal cavity mucosal flap. The superior section must therefore be performed very cautiously, possibly with retraction of the mucosal flaps by using a self-retaining Killian speculum.

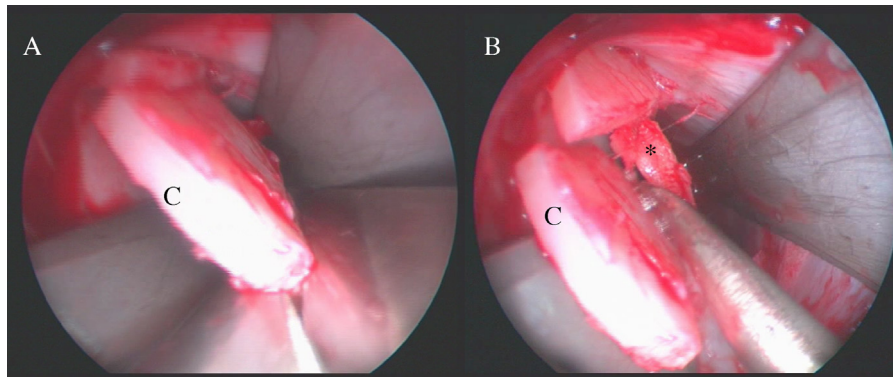
Resection of this strip of cartilage allows clearer visualization of the posterior and inferior part of the septum by creating a larger operative cavity for endoscopic navigation.

#### 2.2.8. Access to the posterior part of the septum

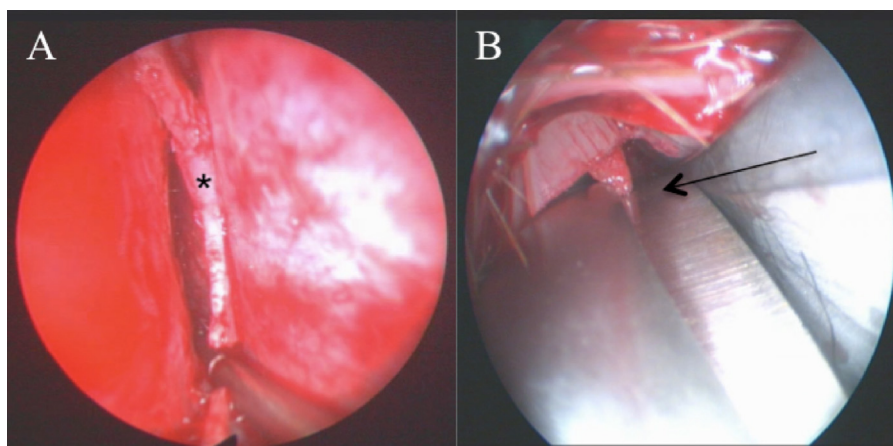
Posterior dissection is continued subperiosteally as far as the vomer and perpendicular plate of the ethmoid (Fig. 6). Bone section is performed with Mayo scissors in the middle part of the bony septum to prevent an irradiated fracture to the skull base during resection of the maxillary crest with a nasal gouge.

#### 2.2.9. Resection of the maxillary crest

Resection of the maxillary crest is performed systematically in order to thin the septum and increase the dimensions of the inferior nasal airway. Subperiosteal dissection starts posteriorly, as the maxillary crest is often straighter at this point, and is continued anteriorly. The anterior nasal spine of the maxilla is exposed and the maxillary crest is resected with a nasal gouge.



**Fig. 5.** Anterior cartilage resection. A. The superior part of the septal cartilage is already sectioned and section of its inferior part is underway. B. Chondro-vomerine dislocation has been performed: the septal cartilage (C) is separated from the vomer (\*) by using a Cottle elevator. A Killian nasal speculum is not systematically used, but can be useful when the mucosal flaps are not sufficiently detached and cannot be easily maintained against the lateral wall of the nasal cavity, resulting in a narrow operative cavity.



**Fig. 6.** Access to the posterior part of the septum. A. Left and right mucoperichondral flaps are detached from the posterior part of the septum (\*) composed of the vomer and the perpendicular plate of the ethmoid. B. The perpendicular plate of the ethmoid is sectioned with Mayo scissors at the site indicated by the arrow.



### 2.2.10. Endoscopic revision and additional resections

The septa mucosal flaps are reapplied and endoscopy of the nasal cavities is performed in order to detect any residual septal deformities that can then be resected as required.

### 2.2.11. Closure

The incision is closed with 1 or 2 Vicryl® rapid 4/0 sutures.

### 2.2.12. Silastic stents

We systematically place 1 mm Silastic® stents on either side of the septum to limit the risk of postoperative haematoma and synechiae and to ensure linear healing of the septum. These stents are fixed by an anterior transfixing suture and are removed on the 10th postoperative day.

## 3. Discussion

The objectives of our endoscopic functional septoplasty technique are to correct septal deviations and remove the maxillary crest. Many types of deviated septum may be observed: C-shaped deviation, septal spur, maxillary crest. A deviated septum can interfere with endonasal procedures, for example on the sinuses, due to impaired vision and/or difficult access to part of the nasal and sinus cavities (such as the frontonasal duct or sphenoethmoidal recess). It may be useful to correct these deformities according to the same operative technique.

Ventilation of a nasal cavity is essentially ensured by an inferior airway in the floor of the nasal cavity between the septum and the inferior nasal concha. The maxillary crest is frequently hypertrophied or even deviated and is systematically resected according to our functional septoplasty technique in order to thin the septum at this level and increase the dimensions of the nasal airway.

Resection of the maxillary crest, when it is responsible for septal deviation, can also be useful in the context of non-functional septoplasty. It allows the surgeon to position the 30° endoscope against the floor of the nasal cavity, allowing good vision of all of the cavity, especially height landmarks, such as the choanal arch for example. This height landmark is useful when performing sphenoïdotomy,

for example. However, this technique cannot replace conventional surgery in the case of deviation anterior to the anterior nasal spine.

## 4. Conclusion

Initial diagnostic endoscopy is essential to correctly evaluate the septal deviation. The mucosal incision must be sufficiently anterior to allow wide access to the deformity. The cartilage incision must preserve Killian's L-strut. Resection of an anterior strip of cartilage allows good visualization of the operative field. Complementary resection of bone and cartilage and the maxillary crest can be performed depending on the characteristics of the deviation. Revision endoscopy is performed to ensure good patency of the nasal airway.

## Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

## References

- [1] Karlsson TR, Shakeel M, Al-Adhami A, Suhailee S, Ram B, Ah-See KW. Revision nasal surgery after septoplasty: trainees versus trainers. *Eur Arch Otorhinolaryngol* 2013;270(12):3063–7.
- [2] Freer OT. The correction of deflection of the nasal septum with minimal traumatism. *JAMA* 1902;38:636–42.
- [3] Killian G. The submucous window resection of the nasal septum. *Ann Otorhinolaryngol* 1905;14:363–93.
- [4] Stammberger H, Posawetz W. Functional endoscopic sinus surgery. Concept, indications and results of the Messerklinger technique. *Eur Arch Otorhinolaryngol* 1990;247(2):63–76.
- [5] Lanza DC. Nasal endoscopy and its applications. *Essent Otolaryngol Head Neck Surg* 1991;373–87.
- [6] Giles WC, Gross CW, Abram AC, Greene WM, Avner TG. Endoscopic septoplasty. *Laryngoscope* 1994;104(12):1507–9.
- [7] Cantrell H. Limited septoplasty for endoscopic sinus surgery. *Otolaryngol Head Neck Surg* 1997;116:274–7.
- [8] Yanagisawa E, Joe J. Endoscopic septoplasty. *Ear Nose Throat J* 1997;76(9):622–3.
- [9] Nayak DR, Balakrishnan R, Murthy KD. An endoscopic approach to the deviated nasal septum – a preliminary study. *J Laryngol Otol* 1998;112(10):934–9.
- [10] Castelnuovo P, Pagella F, Cerniglia M, Emanuelli E. Endoscopic limited septoplasty in combination with sinonasal surgery. *Facial Plast Surg* 1999;15:303–7.